

General

Title

Heart failure mortality: percentage of in-hospital deaths per 1,000 discharges with heart failure as a principal diagnosis for patients ages 18 years and older.

Source(s)

AHRQ QI research version 5.0. Inpatient quality indicator 16 technical specifications: heart failure mortality rate. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 2 p.

National Quality Forum measure information: congestive heart failure (CHF) mortality rate (IQI 16). Washington (DC): National Quality Forum (NQF); 2014 Jan 2. 12 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of in-hospital deaths per 1,000 discharges with heart failure as a principal diagnosis for patients ages 18 years and older.

Rationale

Congestive heart failure (CHF) is a progressive, chronic disease with substantial short-term mortality, which varies from provider to provider. Better processes of care may reduce short-term mortality, which represents better quality.

Evidence for Rationale

National Quality Forum measure information: congestive heart failure (CHF) mortality rate (IQI 16). Washington (DC): National Quality Forum (NQF); 2014 Jan 2. 12 p.

Primary Health Components

Heart failure; death

Denominator Description

Discharges, for patients ages 18 years and older, with a principal International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for heart failure (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Approximately 2 million persons in the United States have heart failure each year (Smith, 1985). These numbers will likely increase as the population ages. The literature suggests that hospitals have improved care for heart failure patients. In a study of 29,500 elderly patients in Oregon, the 3-day mortality decreased by 41% from 1991 to 1995 (Ni & Hershberger, 1999).

Evidence for Additional Information Supporting Need for the Measure

National Quality Forum measure information: congestive heart failure (CHF) mortality rate (IQI 16). Washington (DC): National Quality Forum (NQF); 2014 Jan 2. 12 p.

Ni H, Hershberger RE. Was the decreasing trend in hospital mortality from heart failure attributable to improved hospital care? The Oregon experience, 1991-1995. *Am J Manag Care*. 1999 Sep;5(9):1105-15. [PubMed](#)

Smith WM. Epidemiology of congestive heart failure. *Am J Cardiol*. 1985 Jan 11;55(2):3A-8A. [PubMed](#)

Extent of Measure Testing

Reliability Testing

Data/Sample. Veterans Integrated Service Networks (VISNs); and Department of Veterans Affairs (VA) versus non-VA (Nationwide Inpatient Sample) using VA inpatient data (2004 to 2007) (Borzecki et al., "Trends," 2010).

A survey of hospital and system leaders (presidents/chief executive officers [CEOs]) that was conducted in the first six months of 2006 with a total of 562 respondents. Hospital-level data for these composite measures re produced by applying the Inpatient Quality Indicator (IQI) to the State Inpatient Databases (SID) of the Healthcare Cost and Utilization Project (HCUP) sponsored by the Agency for Healthcare Research and Quality (AHRQ). The SID includes all-payer data on inpatient stays from virtually all community hospitals in each participating state (Jiang et al., 2008).

Using 1995 to 2000 data from New York state ($n = 7,021,065$), analysts compared mortality risk (odds ratio) for individuals with and without Alzheimer's disease (Laditka, Laditka, & Cornman, 2005).

The developer restricted the analysis to 20 states for which HCUP SID were available. There were 1,601 nonfederal, urban, general hospitals in those 20 states. Over 300 hospitals were eliminated from the sample because of key missing variables in the American Hospital Association (AHA) Annual Survey of Hospital data, which was also used for this study, or because they had missing observations for some of the measures that were used. Thus, the sample consisted of 1,290 urban, acute-care hospitals for which complete data were available for 2001 (Laditka, Laditka, & Cornman, 2005).

Analytic Method. VA-and VISN-level IQI observed rates, risk-adjusted rates, and observed to expected ratios (O/Es). The developer examined the trends in VA-and VISN-level rates using weighted linear regression, variation in VISN-level O/Es, and compared VA to non-VA trends (Borzecki et al., "Trends," 2010).

A t-test was used to determine the significance of differences in quality measures (Jiang et al., 2008).

Odds ratio (Laditka, Laditka, & Cornman, 2005).

A likelihood ratio test of the hypothesis that the coefficients on all of these variables were equal to 0 ($\lambda = 35.3$, p less than .01) (Laditka, Laditka, & Cornman, 2005).

Testing Results. VA in-hospital mortality rates for congestive heart failure (CHF) mortality were unchanged over time. The IQIs are easily applied to VA administrative data. They can be useful to tracks rate trends over time, reveal variation between sites, and for trend comparisons with other healthcare systems (Borzecki et al., "Trends," 2010).

The existence of a board quality committee was associated with higher likelihoods of adopting various oversight practices and lower mortality rates for CHF measured by AHRQ's IQIs and SID (Jiang et al., 2008).

Among men, adjusted odds of death were greater for those with Alzheimer's disease (AD) for gastrointestinal CHF (+42 percent, p less than .0001). Among women, AD did not affect risks for most conditions although their risk for death from CHF was less than that for men with AD (Laditka, Laditka, & Cornman, 2005).

The risk-adjusted mortality rate for CHF is not significantly associated with costs. The AHRQ QIs have the advantage of taking the multidimensional nature of hospital quality into account. As the coefficients on the AHRQ QIs show, measures of hospital quality can have conflicting effects on hospital costs. A single measure that combines these effects into one variable offers less insight into hospital performance than the outcomes for each measure (Laditka, Laditka, & Cornman, 2005).

Validity Testing

Data/Sample. Retrospective cohort study based on 2.07 million inpatient admissions between 1998 and 2000 in the California State Inpatient Database (Glance et al., 2008).

2004 to 2007 VA discharge and Vital Status files were used (Borzecki et al., "Comparison," 2010).

Analytic Method. The AHRQ IQI software was used to calculate risk-adjusted mortality rates using either 1) routine administrative data that included all the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes or 2) enhanced administrative data that included only the ICD-9-CM codes representing preexisting conditions (Glance et al., 2008).

The developer derived 4-year facility-level in-hospital and 30-day observed mortality rates and observed/expected ratios (O/Es) for admissions with a principal diagnosis of acute myocardial infarction, CHF, stroke, gastrointestinal hemorrhage, hip fracture, and pneumonia. Software-calculated O/Es were standardized to the VA population and compared O/Es and outlier status across sites using correlation, observed agreement, and kappas (Borzecki et al., "Comparison," 2010).

Testing Results. Without using Present on Admission (POA) data, for CHF 25% of hospitals classified as low-quality hospitals using enhanced administrative data were misclassified as intermediate-quality hospitals using routine administrative data. Despite the fact that the AHRQ IQIs were primarily intended to serve as a screening tool, they are being increasingly used to publicly report hospital quality. These findings emphasized the need (which the AHRQ QI have now adopted by incorporating POA data in the risk-adjustment) to improve the "quality" of administrative data by including a POA indicator if these data are to serve as the information infrastructure for quality reporting (Glance et al., 2008).

Of 119 facilities, in-hospital versus 30-day mortality O/E correlations were generally high (median: $r = 0.78$; range: 0.31 to 0.86). Examining outlier status, observed agreement was high (median: 84.7%, 80.7% to 89.1%). Kappas showed at least moderate agreement (k greater than 0.40) for all indicators except stroke and hip fracture ($k = 0.22$). Across indicators, few sites changed from a high to nonoutlier or low outlier, or vice versa (median: 10, range: 7 to 13). The AHRQ IQI software can be easily adapted to generate 30-day mortality rates. Although 30-day mortality has better face validity as a hospital performance measure than in-hospital mortality, site assessments were similar despite the definition used (Borzecki et al., "Comparison," 2010).

Refer to the original measure documentation for additional measure testing information.

Evidence for Extent of Measure Testing

Borzecki AM, Christiansen CL, Chew P, Loveland S, Rosen AK. Comparison of in-hospital versus 30-day mortality assessments for selected medical conditions. *Med Care*. 2010 Dec;48(12):1117-21. [PubMed](#)

Borzecki AM, Christiansen CL, Loveland S, Chew P, Rosen AK. Trends in the inpatient quality indicators: the Veterans Health Administration experience. *Med Care*. 2010 Aug;48(8):694-702. [PubMed](#)

Glance LG, Osler TM, Mukamel DB, Dick AW. Impact of the present-on-admission indicator on hospital quality measurement: experience with the Agency for Healthcare Research and Quality (AHRQ) Inpatient Quality Indicators. *Med Care*. 2008 Feb;46(2):112-9. [PubMed](#)

Jiang HJ, Lockee C, Bass K, Fraser I. Board engagement in quality: findings of a survey of hospital and system leaders. *J Healthc Manag*. 2008 Mar-Apr;53(2):121-34; discussion 135. [PubMed](#)

Laditka JN, Laditka SB, Cornman CB. Evaluating hospital care for individuals with Alzheimer's disease using inpatient quality indicators. *Am J Alzheimers Dis Other Dement*. 2005 Jan-Feb;20(1):27-36. [PubMed](#)

National Quality Forum measure information: congestive heart failure (CHF) mortality rate (IQI 16). Washington (DC): National Quality Forum (NQF); 2014 Jan 2. 12 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 18 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Making Care Safer

Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

Time window can be determined by user, but is generally a calendar year.

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

Discharges, for patients ages 18 years and older, with a principal International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for heart failure

Note: Refer to the original measure documentation for ICD-9-CM codes.

Exclusions

Exclude cases:

- Transferring to another short-term hospital (DISP=2)

- Major Diagnostic Categories (MDC) 14 (pregnancy, childbirth, and puerperium)

- With missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing),

quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator

Exclusions

Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Death

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate. Required data elements: Patient gender; age in years at admission; International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal and secondary diagnosis codes. A limited license 3M APR-DRG grouper is included with the Agency for Healthcare Research and Quality (AHRQ) Quality Indicator (QI) Software.

Standard of Comparison

not defined yet

Identifying Information

Original Title

IQI 16: heart failure mortality rate.

Measure Collection Name

Agency for Healthcare Research and Quality (AHRQ) Quality Indicators

Measure Set Name

Inpatient Quality Indicators

Submitter

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Developer

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Funding Source(s)

Agency for Healthcare Research and Quality (AHRQ)

Composition of the Group that Developed the Measure

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicator (QI) measures are developed by

a team of clinical and measurement experts in collaboration with AHRQ. The AHRQ QIs are continually updated as a result of new research evidence and validation efforts, user feedback, guidance from the National Quality Forum (NQF), and general advances in the science of quality measurement.

Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2013 Jan 5

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Mar

Measure Maintenance

Measure is reviewed and updated on a yearly basis

Date of Next Anticipated Revision

Spring 2016 (version 6.0, including International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10-CM] and International Classification of Diseases, Tenth Revision, Procedure Coding System [ICD-10-PCS] compatible software)

Measure Status

This is the current release of the measure.

This measure updates a previous version:

AHRQ quality indicators. Guide to inpatient quality indicators: quality of care in hospitals - volume, mortality, and utilization [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 91 p.

AHRQ quality indicators. Inpatient quality indicators: technical specifications [version 4.2]. IQI #16 congestive heart failure (CHF) mortality rate. Rockville (MD): Agency for Healthcare Research and

Measure Availability

Source available from the [Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators \(QI\) Web site](#) .

For more information, contact the AHRQ QI Support Team at E-mail: QIsupport@ahrq.hhs.gov; Phone: 301-427-1949.

Companion Documents

The following are available:

AHRQ quality indicators. Inpatient quality indicators (IQI) parameter estimates [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 42 p. This document is available from the [AHRQ Quality Indicators Web site](#) .

AHRQ quality indicators. Inpatient quality indicators benchmark data tables [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 22 p. This document is available from the [AHRQ Quality Indicators Web site](#) .

AHRQ quality indicators. Inpatient quality indicators composite measure workgroup. Final report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar. various p. This document is available from the [AHRQ Quality Indicators Web site](#) .

HCUPnet: a tool for identifying, tracking, and analyzing national hospital statistics. [Web site]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); [accessed 2015 Sep 10]. HCUPnet is available from the [AHRQ Web site](#) .

NQMC Status

This NQMC summary was completed by ECRI on December 4, 2002. The information was verified by the Agency for Healthcare Research and Quality on December 26, 2002.

This NQMC summary was updated by ECRI on April 7, 2004, August 19, 2004, and March 4, 2005. The information was verified by the measure developer on April 22, 2005.

This NQMC summary was updated by ECRI Institute on August 17, 2006, on May 29, 2007, on October 20, 2008 and again on August 27, 2010.

This NQMC summary was reviewed and edited by ECRI on July 13, 2011.

This NQMC summary was retrofitted into the new template on July 14, 2011.

This NQMC summary was updated by ECRI Institute on March 25, 2013 and again on December 9, 2015. The information was verified by the measure developer on February 16, 2016.

Copyright Statement

No copyright restrictions apply.

Production

Source(s)

AHRQ QI research version 5.0. Inpatient quality indicator 16 technical specifications: heart failure mortality rate. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 2 p.

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